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On the Status of several species belonging to the two genera, *Fregetta* Bp. and *Fregettornis* Mathews

By J. R. KINGHORN, R.A.O.U., Zoologist, Australian Museum, and NEVILLE W. CAYLEY, R.A.O.U., Sydney.

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Introduction.

The acquisition by the Australian Museum of several specimens of *Fregettornis* from Lord Howe Is., led us to compare them with others of the genus *Fregetta*, and to investigate the status of several species belonging to both genera. Thorough search permits us to include *Fregetta melanogaster*, *F. tubulata* and *F. leucogaster*, as synonyms of *F. tropica*, Gould, and we have placed *Fregettornis royanus*, *insularis*, *alisteri*, and *innominatus* under *Fregettornis grallarius*, Vieillot. Such a course may at a glance seem rather drastic; but on careful comparison of the various descriptions, and examination of the volumes quoted in the appended bibliography, we found no other course open to us.

Such slight colour-variation as exists between the several species mentioned above is evidently due to some or all of the following causes:—Firstly, according to Loomis¹, no two birds are exactly alike; a feature which is explained by the fact that moulting in any species varies in different individuals, independent of their age, physical state, or time of breeding. Loomis found that in many species the breeding season was protracted over a very large part of the year, not only in tropical, but in temperate regions. Secondly, wear and tear of plumage through fading and abrasion are so great in sea-birds that in the older

ones, the smaller markings on the tips of the feathers are often missing, and Loomis² suggests that descriptions can hardly be called complete unless both worn and fresh plumage is described. Thirdly, sexual and individual variation must be taken into account; variation in size may be sexual or physical, and variation in colour may be ascribed to the same causes. Loomis³ also points out that the most common variation in colour is the intrusion of white in dark areas and of dark colour in white areas. We have found this to be very forcibly brought before us on examining several species of sea-birds, and we agree with Loomis both in this and in his previous observations and statements.

We are grateful to the Trustees of the National Museum, Melbourne, for the loan of several specimens of *Fregetta* which bear Gould's labels; to the Trustees of the Macleay Museum, University of Sydney, for permission to examine specimens in the collection there; and to Mr. A. R. McCulloch, zoologist at the Australian Museum, for valuable assistance in reference to synonymy and literature.

Genus *Fregettornis*, Mathews.

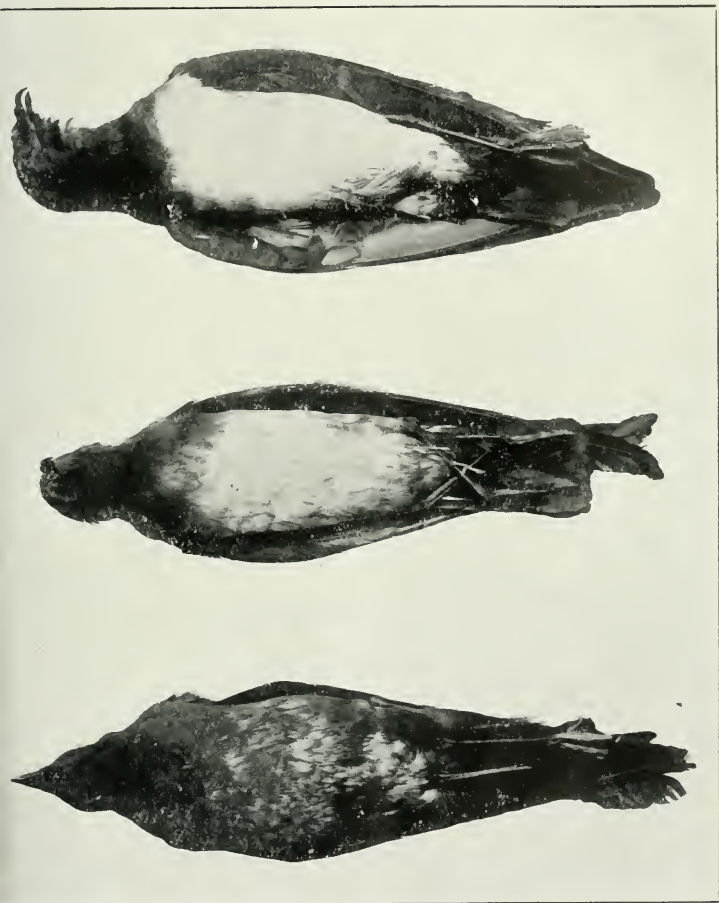
This genus, the type of which is *Procellaria grallaria*, Vieillot,⁴ was separated from *Fregetta*, Bonaparte, because its tarsus is scutulated instead of booted; the two appear to be distinguishable, however, by other and more definite characters.

In the paper in which Bonaparte⁵ created the new genus *Fregetta* he made *Thalassidroma leucogaster*, Gould, the genotype, and mentioned *T. tropica* and *T. melanogaster*. In defining the genus, he stated that the toes did not stretch beyond the tail, notwithstanding the long tarsus. We fail to understand how this statement came to be made; Gould's original description did not mention this character, and Gould's own specimens (which we have before us) certainly show that the outstretched legs do extend beyond the tail. Bonaparte could not have examined the type of *T. leucogaster*, and his observation must have been made from a shrunken skin. Of the several skins in our possession, four are labelled by Gould in his own handwriting; one is called *T. melanogaster*, one *T. tropica*, and two *T. leucogaster*. All these, together with several in the Macleay Museum at the University of Sydney, have the toes stretching well beyond the tail.

In all our specimens of *Fregettornis*, on the other hand, the legs when stretched out do not reach to the end of the tail. This is due to the very short feet; drawings of which are given here for comparison with those of *Fregetta tropica* and its synonym *T. leucogaster*.

Fregettornis is apparently distinguished from *Fregetta* by the following characters:—

Length of the culmen, 13-14 mm.; toes short, the middle toe, including the claw, 20-21 mm. and sub-equal in length to



VIEILLOT STORM PETREL (suggested name).—*Fregattornis gallartius*, Vieillot, showing three stages of plumage. 1. Specimen C of text; 2. Specimen B of text; 3. Specimen A of text. All are from Lord Howe Island, South Pacific Ocean. Photo. by C. Clutton, Australian Museum.

the other toes; tarsus, 35-37 mm.; claws spatulate, very broad and blunt*; legs not reaching the end of the tail. *Fregettornis*. See Figs. 1-3.

Length of the culmen, 15-15.5 mm.; toes long, the middle toe, including the claw, 25-30 mm., being distinctly longer than other toes; tarsus, 38-43 mm.; claws, though spatulate, longer and sharper; legs reaching beyond the tail. *Fregetta*. See Figs. 4-7.

Although the genus *Fregettornis* was established by Mathews in his "Birds of Australia," vol. ii., pt. 1, 1912, p. 31, it was not used by him in the succeeding pages of the same work, and he referred its genotype to the genus *Fregetta* under the trinomial *Fregetta grallaria grallaria*.⁶ Further, he confused *Thalassidroma leucogaster*, Gould, a species of *Fregetta* proper, with *Fregetta grallaria*, placing it in the synonymy of the latter. The error is, however, corrected in Mathews' List of the Birds of Australia,^{6a} where the name *Fregettornis grallarius* is again brought to light. Later,⁷ Mathews and Iredale give a full description of this species.

VIEILLOT STORM-PETREL (*FREGETTORNIS GRALLARIUS*, VIEILLOT.)

Procellaria grallaria, Vieillot, Nouv. Dict. d'Hist. Naturelle, vol. xxv., 1817, p. 418.

Fregettornis grallarius, Vieillot, Mathews and Iredale, Manual of the Birds of Australia, vol. i., 1921, p. 21; Pls. iv., Fig. 7, and vii., Fig. 6.

Fregettornis royanus, Mathews, Austral Avian Record, vol. ii., 1914, No. 5, p. 86.

Fregettornis insularis, Mathews, loc. cit. vol. ii., 1915, No. 7, p. 124.

Fregettornis alisteri, Mathews, loc. cit.

Fregettornis innominatus, Mathews, loc. cit.

Synonymy.—Examination of several specimens of *Fregettornis* from Lord Howe Island, and a comparison of them with the various descriptions of the above species, leads us to the conclusion that all are referable to a single species, *F. grallarius* Vieillot. Mathews'¹¹ several descriptions are not as perfect as they might be; but apart from small colour differences, his measurements of the various birds are so close to each other,

*Mathews' figure of *F. grallaria grallaria* (8) does not agree with his description, nor with our specimens of *F. grallarius* so far as the claws are concerned. The figure shows them to be long and sharp, not short and blunt; they do not appear to be even spatulate, and it seems that the figure was prepared from a specimen of *T. leucogaster*, Gould, which we regard as synonymous with *Fregetta tropica*. The figure of the tarsus and toes of *Fregettornis grallarius* in Mathews and Iredale's Manual of the Birds of Australia, vol. 1, plate iv., fig. 7, is correct, and typical of the species.

that we consider it impossible to find specific differences between them.

The material before us as we compile this paper, besides a large quantity of literature (nearly thirty volumes having been consulted) consists of three specimens of *Fregettornis* from Lord Howe Is., as follows:—

A.—A very dark specimen with very little white on the abdomen, collected by Messrs. McCulloch and Troughton in the Erskine Valley, February, 1921. This flew into a camp after dark, being attracted by either a light or noise.

B.—A lighter specimen with a more mottled abdomen. This was found, with a broken wing, by Mr. R. Baxter, on a beach towards the end of 1921.

C.—A specimen collected by Professor T. H. Johnston in October, 1910, which is part of the "H. L. White Collection" in the National Museum, Melbourne. This specimen is very important; it is the one which was described, but left "unnamed," by Mathews.^{8a} So far as we can find, Mathews fails to make further reference to this "unnamed" bird in any recent work, so we are fortunate in having it before us as we write.

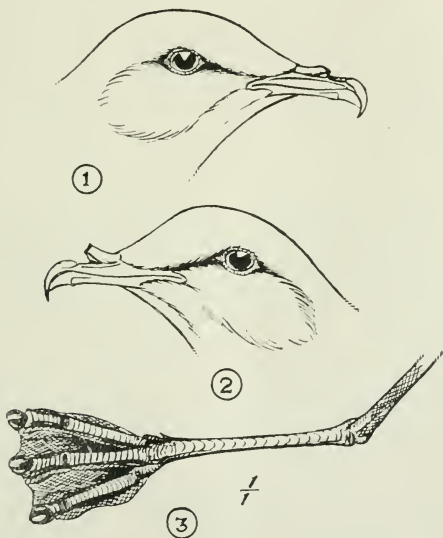
Mathews and Iredale⁹, in a note at the end of the description of *F. grallarius*, say "Examination of Vieillot's type proves that it is not the Lord Howe Island sub-species, but the South American." This must be a mistake, as we have consulted Vieillot's own original description,¹⁰ in which he definitely states that his bird came from New Holland.

Mathews and Iredale⁹ place *F. innominatus* in the synonymy of *F. grallarius*, and it is through this action that we are helped in identifying Mathews' other nominal species. Such slight colour variation as exists between *F. royanus*, *F. alisteri*, *F. insularis*, and *F. innominatus* is evidently due to some or all of the several causes explained by Loomis,¹ and quoted by us in an introductory paragraph.

VARIATION OF *FREGETTORNIS GRALLARIUS*.

The nasal tube.—The bird collected by Professor T. H. Johnston (Specimen C) was described by Mathews,¹² but was left unnamed. He remarked that its greatest peculiarity was the depressed or flattened nasal tube, which he thought might have been soft in life; another feature was the approach of the forehead feathers to the culmen, which gave the bird a vulturine appearance. We noted these peculiarities when we first examined the skin, and also observed that the specimen captured by Messrs. McCulloch and Troughton (specimen A) showed exactly the same characteristics. We decided, however, to moisten the nasal tube of one specimen with spirits and warm water, and found that, so soon as it was thoroughly soaked it assumed an upright position, though it did not become quite so erect or recurved as in a specimen preserved in spirit (B), which was col-

lected by Mr. Baxter. In this latter bird, the nasal tube is what we regard as normal, being in no way damaged, and is upright and recurved almost as much as in *Fregatta tropica*. We also note that the under-portion of the nasal tube is soft, and, if great care be not taken when making the bird up as a skin, is liable to collapse: this spirit specimen having since been made up as a skin, we find that the tube has failed to keep its exact original shape on account of the contraction of the soft parts noted. This experiment has proved that no importance can be attached to the result of a casual examination of nasal tubes which appear to have been soft in life. In support of this we may mention that, prior to our experiment, we shared the opinion of several well-known ornithologists who examined our Australian Museum specimen, that so flattened a nasal tube could never assume the ordinary upright position found in the several well-known species of *Fregatta*.



Fregattornis grallarius, Vieillot.

1. Shows the nasal tube in a collapsed condition.
2. Shows normal nasal tube.
3. The short, sub-equal toes, rounded spatulate claws, scutulated toes and tarsus, all of which are typical of the genus.

The bill.—The variation in the shape of the bill is so slight that we regard it as negligible; but that of specimen (B) which

was collected by Mr. Baxter, appears slightly heavier throughout, though it is of the same length as the bills of our other specimens before us, and also in Mathews' two nominal species, *F. royanus* and *F. innominatus*; in his *F. insularis* and *F. alisteri*, it measures 13 mm.¹¹

Middle toe and claw.—In our Erskine Valley specimen (A) the measurement is 20.5 mm.; in that collected by Mr. Baxter (B) it is 21 mm., while in the "H. L. White Collection" specimen (C) it is 20 mm. It will be noted that the spirit specimen (B) has a longer toe than either of the others; variation which seems to be due to shrinkage in the joints of the dried skins.

Tarsus.—The measurement of the tarsus varies slightly. In the Erskine Valley specimen (A) it is 36 mm. long; in Baxter's specimen (B) it is 35 mm., and in the "H. L. White Collection" specimen (C) it is 37 mm.; in *F. royanus* it is said to be 35 mm., *F. insularis* 38 mm., *F. alisteri* 36 mm., and *F. innominatus* 37 mm. It will be noticed that these measurements overlap, the smallest being 35 mm., and the largest 38 mm.; but the difference of 3 mm. is not a serious item even in such a small bird, as the points from which the measurements are made vary slightly through shrinkage. This statement is borne out by an examination of the tarsi of other species, and also by reference to tabulations of characters given by Dr. Sharpe and other authorities.

Tail.—The tail of the Erskine Valley specimen (A) measures 83 mm., Baxter's specimen (B) about 76 mm., and the "H. L. White Collection" specimen (C) 79 mm.; that of *F. royanus* is said to be 79 mm. long, *F. insularis* 80 mm., *F. alisteri* 75 mm., and *F. innominatus* 80 mm. The difference between that of *F. alisteri* (75 mm.) and the Erskine Valley specimen (83 mm.) being equal to only a third of an inch, we consider it a matter of little importance.

Wing.—That of the Erskine Valley specimen (A) is 159 mm. long, Baxter's example (B) 153 mm., and the "H. L. White Collection" specimen 160 mm.; in *F. royanus* it is 160 mm., *F. insularis* 168 mm., *F. alisteri* 165 mm., and *F. innominatus* 160 mm. Again it will be seen that the measurements are variable, and are in no way comparative to any other measurements.

Total length.—It is difficult to determine what "total length" means in the various works referred to. Some writers have measured from the forehead to the tip of the tail; others seem to have measured from the forehead to the tip of the folded wings, which stretch beyond the tail; again, measurements have been taken from the base of the culmen to either of the other points mentioned. Some authors measure from the tip of the bill to the tip of the tail. These measurements depend on the position of the head, and whether the bill is in line with the body or pointing upwards when the bird is on its back; furthermore, the neck, or in fact the whole skin, may be either stretched

or contracted in a made-up skin, so a considerable allowance must be made in comparing such measurements.

The skins before us, when measured from the forehead to the tip of the tail, vary from 170 mm. to 179 mm., while the measurements given by Mathews¹¹ of his nominal species vary from 200 to 215 mm. If, however, our specimens be measured from the tip of the bill to the tip of the tail, the measurements exceed 200 mm., and almost correspond with those given by Mathews.

Colour.—Having disposed of the measurements, we will proceed to deal in detail with the arrangement of the colours in the three specimens before us, comparing them with those given in Mathews' descriptions. The following is his description of *F. royanus*: "Entire plumage sooty black, darkest on the upper tail coverts. Wings and tail black. A large subterminal band of white is noticeable on the under surface and the upper tail coverts, on examining the feathers. Tail square." The specimen collected by McCulloch and Troughton at Erskine Valley (A) agrees better with this description than with that of any other of the nominal species, but the abdominal and lower breast feathers are, here and there, white almost to their tips, which gives a mottled appearance to these parts. The upper tail coverts also show a little white, and we regard this bird as in a more advanced stage of moult than *F. royanus*, and think that several more moults would leave the abdomen pure white, as in *F. grallarius*. Further evidence in support of this contention is afforded by the characters of specimen (C). The colour description, as published by Mathews,¹² is reprinted here: "It is much darker than *F. g. grallaria*, and has black fringes to the rump feathers, square tail, the bases of the feathers of the throat are dark, but the white lower-breast and abdomen are flecked with grey, especially noticeable on the flanks, and the axillaries are streaked with grey, whereas in every other specimen they are pure white; the under tail-coverts are white with dark tips, whereas in *F. g. grallaria* they would be said to be dark with white bases." We cannot find much difference in these two last statements; examination of the specimen shows that some of the under tail coverts are largely white with dark tips, and others largely dark with white bases. "Another noticeable feature is the lack of white on the inner wing coverts." The specimen (B) presented to the Australian Museum by Mr. Baxter has more white than that collected by Messrs. McCulloch and Troughton (A), but a little less than the example described by Mathews (C). It shows just a little white on the under surface of the wing.

With the exception of Vieillot's type, all the specimens on which the various names are based are from Lord Howe Island. Vieillot's bird was taken in southern seas, on the voyage to Australia, and he states definitely that it came from Australia when he writes "*on le trouve a la Nouvelle Hollande.*"

Conclusions.—With the three specimens, A, B, and C, before us, which we have critically compared with Mathews' descriptions of his *F. royanus*, *F. innominatus*, *F. insularis*, and *F. alisteri*,¹¹ we conclude that they, as well as Mathews' specimens, are all referable to the one species, each being in different stages of moult or age or both. We have pleasure in proposing the vernacular name—*Vieillot Storm-Petrel*—for this species.

NOTES FROM PARIS RELATING TO VIEILLOT'S TYPE

Since compiling this paper we have been very fortunate in getting into touch with Monsieur J. Berlioz, of the Paris



Cete et bec

(grandeur naturelle)

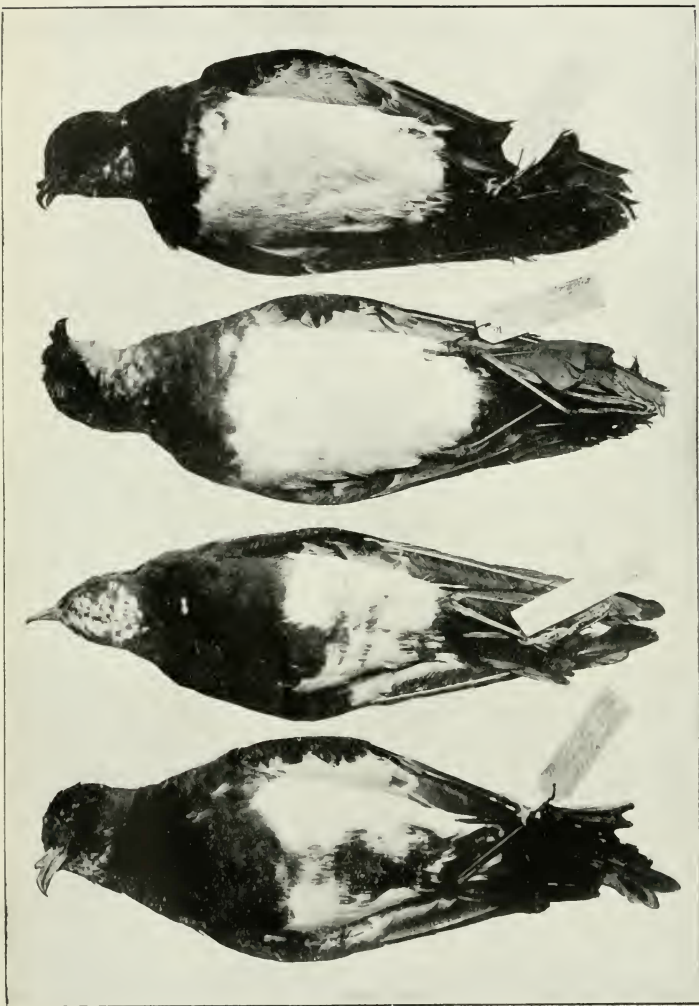


patte gauche

Fregatta grallaria (Vieill.), type

Museum, and we are very grateful to him for the trouble he has gone to in making comparisons for us, and in supplying us with the information which we sought.

Unfortunately he was unable to procure photographs of Vieillot's type of *Fregatta grallaria* (*Fregattornis grallarius*), but he drew the accompanying text figures from the type specimen, adding that: "As the specimen was mounted, and rather badly prepared, it was impossible to say whether the extended feet did or did not reach to the end of the tail." The reason for the absence of scutellation on the tarsus of his text figure is, that the legs and feet of the type were so covered in varnish that it was not possible to distinguish the scutes sufficiently, but



GOULD STORM PETREL (suggested name).—*Fregatta tropica*, Gould, showing different stages of plumage. These specimens were labelled and identified by Gould as follows:—1. *Thalassidroma tropica*, Gould—Atlantic Ocean. 2. *Thalassidroma melanogastris*, Gould—Lat. 43° 18', South Long. 140° 52' East. 3. *Thalassidroma leucogastra*, Gould—S. Indian Ocean ♂. 4. *Thalassidroma leucogastris*, Gould—S. Indian Ocean ♀. (Numbered left to right)

the dimensions and general aspect corresponded well to the drawing of the tarsus and foot of one of our Lord Howe Island birds, and not to that of *Fregetta leucogaster*, both of which were enclosed in our letter to him. Mr. Berlioz appended a colour description, the translation of which is as follows:—

"The plumage is a sooty brown, much darker on the remiges and retrices, more pale on the wing coverts; these are the same as the feathers of the back, possessing a whitish border; without doubt a sign of its immaturity. The lower breast and the entire abdomen are white, as well as the rump and upper tail coverts, the under tail coverts are white at the base and brown at the tip. Total length (from base of beak to end of tail), 170 mm.; culmen, 19 mm.; tarsus, 34 mm.; middle toe and claw, 21 mm.; wing, 170 mm.; tail, 79 mm."

We compared these measurements with his enclosed drawings which are natural size, and we find that the culmen must have been measured from the angle of the mouth; this would give the 19 mm., as noted by Mr. Berlioz (see text figure), while the wing was most probably measured from the junction with the body, and not from the bend, by allowing for this difference, the measurement would then be from 165—170. (We checked and compared these carefully with the specimens at our command before coming to any conclusions). By adding the length of the bill to the total length given, we find that the dimensions should then read—

Total length, 184 mm.; culmen, 14 mm.; wing, 165 mm.; tail, 70 mm.; tarsus, 35 mm.; middle toe without claw, 18 mm.; with claw, 21 mm.

These readjustments bring the measurements into line with those already published, and so give a better basis for comparative work. We believe that the above figures are the first ever published of Vieillot's Type.

Mr. Berlioz further stated that the Type did not carry any indication of Bonaparte.

We now feel assured that by the publication of this information, together with the drawings of the type, no doubt should remain as to the validity of Mathews genus *Fregettornis*. Furthermore, it should greatly assist readers in following the arguments set forth in our paper.

GOULD STORM-PETREL.—*FREGETTA TROPICA*,

Gould.

Thalassidroma tropica, Gould, Ann. Mag. Nat. Hist., vol. xiii., 1844, p. 366.

Thalassidroma melanogaster, Gould loc. cit. p. 367.

Thalassidroma leucogaster, Gould loc. cit. p. 367.

Fregetta tubulata (Gould m.s. loc. cit. p. 367), Mathews, "Birds of Australia," vol. 11, pt. 1, 1912, p. 41.

Fregetta grallaria, of Authors (not of Vieillot).

A glance at the above synonymy will show that we include *T. leucogaster* Gould, and *F. tubulata* Mathews, under *F. tropica* Gould. This course was not adopted until a thorough examination was made of the specimens available, comparing them critically with the various descriptions and notes made by the authorities quoted in the bibliography. In discussing this question we refer to our introduction, in which we quote and abide by the various observations and opinions held by Loomis.¹

The specimens before us number ten: Four of these were identified and labelled by Gould, two as *Thalassidroma leucogaster*, one as *T. melanogaster*, and one as *T. tropica*. The remaining six were distributed as follows: Two mounted specimens of *F. tropica* in the Australian Museum, and four of *T. melanogaster* in the Macleay Museum, University of Sydney. We have pleasure in proposing for this species the vernacular name—Gould Storm-Petrel.

F. leucogaster as opposed to *F. grallaria*.

Bonaparte¹⁴ wrongly placed *T. leucogaster* Gould as a synonym of *P. grallaria* Vieillot, and this mistake has been continuously accepted since that time. Later, several specimens collected by the *Challenger* Expedition were identified as *F. grallaria*, instead of *F. leucogaster*, an action which has caused most of the trouble since, as authors have evidently followed this lead. We therefore hold that the *F. grallaria* referred to by most authors is really the form usually recognised as *Fregetta leucogaster*, Gould. This latter species is generally placed in the synonymy of *Fregetta grallaria*; but as *F. leucogaster* is certainly not *Fregetta grallaria* Vieillot, which has been placed in the new genus *Fregettornis*, by Mathews,¹⁵ it is probable that the *F. leucogaster* referred to above is synonymous with *Fregetta tropica*.

VARIATION.

Godman¹⁶ refers to *Fregetta grallaria* as being closely allied to *Fregetta melanogaster*; but he states that the former always has a white belly and white margins to the feathers of the back. Dr. Bowdler Sharpe,¹⁷ who uses the generic name *Oceanites* in preference to *Fregetta*, says that "the differences between *O. melanogaster* and *O. tropica* are extremely slight, consisting in the white throat and the greater amount of black in the abdomen and centre of the body, in the latter bird. I believe it possible that *O. leucogaster* is also only a stage of plumage of the same species, the four specimens in the Museum being apparently immature, with narrow whitish edgings to the feathers of the upper surface. . . ." Both Salvin and Godman¹⁸ oppose this, and Godman says that *grallaria* never shows any black on the abdomen, while the white banded specimens which he examined in the British Museum appeared to be adult birds. He also states that the white edges to the feathers of the back seem to

be the sign of adult plumage in *grallaria* and juvenile in *melanogaster*. Later, in referring to *Fregetta grallaria*, he says:¹⁹ "A specimen from Ambrose Is. shows only slight traces of white fringes to the dorsal feathers, but the breast and abdomen are pure white, there being no trace of black. This seems to indicate that the white bars disappear more or less in fully adult birds." This statement contradicts his earlier one to the effect that the white edgings to the feathers of the back are a sign of the adult stage. We think that the presence or absence of the white edgings to the feathers should not be taken into account as in any way connected with specific characters, and should be put down to variation caused by wear and tear or due to moult or age.²⁰ The white edgings to the feathers occur both in the white-bellied and black-bellied forms, and Mathews makes a point of this on p. 40 of the work previously quoted.

Loomis²¹ mentions that a specimen of *Fregetta grallaria* (presumed by us to be *F. leucogaster*), which was shot in latitude 4° 20' S., longitude 93° 30' W. (in the vicinity of the Galapagos Islands) was undergoing a complete moult. The worn feathers of the dorsal region were black with vestiges of white tips in some instances, while the new feathers were heavily washed with grey and broadly tipped with white. The throat feathers were more or less white basally. He points out that in some specimens the throat feathers are said to be wholly dark, a phase which may be due to the existence of a dual coloration similar to that which exists in *Puffinus griseus* and *Puffinus chlororhynchus*. We agree with Loomis, and think that wear and tear, dichromatism, geographic and individual variation would account for the uniting of several species, which are at present placed under different names.

Mathews,²² "A specimen labelled *Fregetta* ♀ *melanogaster* Gould. Off the E. Coast of N.S.W., May, 1875.' This is the only authentic Australian produced specimen known to me. The skin shows slight whitish tips to back feathers; whitish bases to throat show an as obscure whitish patch; the belly mark distinct but ill defined; lower tail coverts have long black tips with white bases and extend to end of tail: there is a whitish patch on inner wing coverts and a brownish outer wing covert patch. Wing 146, tail 69, tarsus 41, mid. toe 27, culmen 15 mm. Nostrils tending upward. This is my *Fregetta tropica australis*. Gould had not an Australian specimen of this bird or *grallarius*."

One of Gould's specimens of *T. melanogaster* is labelled by him as being from latitude 43° 18' S., longitude 140° 52' E., this locality being about 200 miles west of Cape Grim, Tasmania.

On March 24-25, 1922 a visit to the Macleay Museum revealed the four specimens of *Fregetta melanogaster* mentioned above, comprising two flat skins (females) and two mounted skins (male and female), all four being from "off East Coast of New South Wales, May, 1875." On the flat skins the following notes were made:—Nostrils raised well up from the culmen on

the one specimen but slightly more flattened on the other. The white patches on the throat are conspicuous; the central dark patch on the belly is interrupted with white, and there are whitish specks on the feathers in front of the eyes. The measurements of the two are as follows:—Wing, 149, 157; tail, 67, 71; tarsus, 41, 43; middle toe and claw, 28, 28; culmen, 15, 15.

It will be noted that none of the measurements agree in all respects with those given by Mathews, but the former bird is most probably the specimen examined by him.

The characters of the mounted specimens are as follows:—Female, the nostrils not very erect, the dark belly marking distinct, the under tail coverts not reaching the end of the tail. The light patch on the upper wing coverts is more noticeable than in any other specimen examined, while there is not a light patch in front of the eye. In the male, there is a light patch in front of the eye, and the facial feathers are lighter than in the female, the nostrils are more erect, and there is a very distinct whitish patch under the throat. The black belly marking is indistinct, and is interrupted half-way down by the infusion of white feathers. The measurements are:—Female: wing, 162; tail, 70; tarsus, 39; middle toe and claw, 27; culmen, 15. Male: wing, 156, tip missing; tail, 71; tarsus, 40; middle toe and claw, 27; culmen, 15.

The characters of the other specimens before us, which, as stated before, bear Gould's own labels are as follows:—

T. leucogaster, Gould.

The feathers of the back show broad whitish tips down to the rump feathers; there is a white patch on the throat; chest and abdomen white, as also are the upper tail coverts and under wing coverts. The under tail coverts are black with white bases; two or three have faint white edges. A white patch is in front of the eyes. Total length, 180 mm.; tail, 79; wing, 156; tarsus, 39; middle toe and claw, 28; culmen, 15 (male); locality, South Indian Ocean.

The female has very few of the back feathers with broad white tips; those on the upper back, being worn or weathered, show but faint white edges. White patch in front of the eye on left side, but not on right side of head. The other characters are as above. Total length, 178 mm.; tail, 77 (tip worn away); wing, 156; tarsus, 41; middle toe and claw, 28.5; culmen, 15; locality, South Indian Ocean.

T. melanogaster Gould.

A few of the feathers of the back show very faint light edges. The white patch on the throat is conspicuous. Central belly-marking very irregular. Under and upper tail coverts as in *leucogaster*. The under wing coverts tend to white; they may be said to be almost mottled; the innermost ones are white on the right wing and dark on the left. White patch in front of eyes present but indistinct. Total length, 176 mm.; tail, 77; wing, 158; tarsus, 39; middle toe and claw, 27; culmen, 15 (male).



GOULD STORM PETREL.—*Fregatta tropica*, Gould. Dorsal view of birds shown on previous plate labelled and identified by Gould as follows:—1. *Thalassidroma tropica*, Gould—Atlantic Ocean. 2. *Thalassidroma melanogaster*, Gould—S. Lat. 43° 18', Long. 140° 52' East. 3. *Thalassidroma leucogaster*, Gould—S. Indian Ocean ♀. 4. *Thalassidroma leucogaster*, Gould—S. Indian Ocean ♀. Photo. by C. Clutton, Australian Museum.

Locality, latitude 43° 18' S., longitude 140° 52' E. (about 200 miles west of Cape Grim, Tasmania).

T. tropica Gould.

The feathers of the back have white edges; there is a small whitish patch on the throat; under wing coverts white; the central belly markings blackish but broken near the chest. Under tail coverts black with white bases; two or three have faint white edges; upper tail coverts white; no white in front of eyes. Total length, 183 mm.; tail, 80; wing, 157; tarsus, 41; middle toe and claw, 28; culmen, 15; bill slightly heavier in build than in any other specimen (sex ?). Locality, Atlantic Ocean.

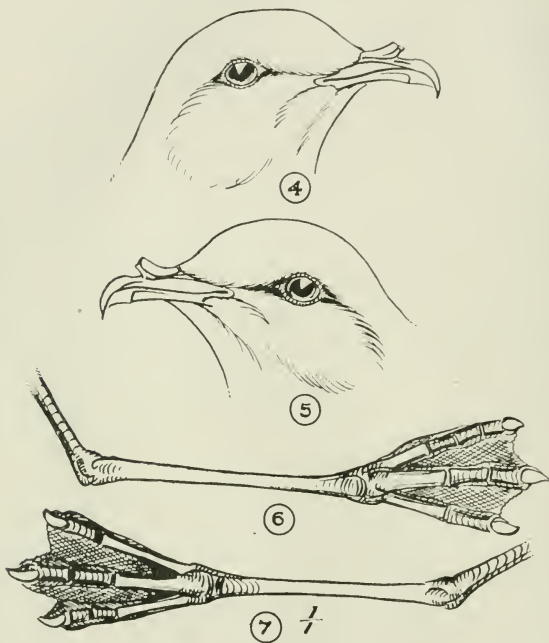
Coues²³ examined a large series of birds, which he placed under the name of *F. grallaria*, but which were not of this species, as most of them were labelled *T. leucogaster* Gould. Among them were Gould's types, which Coues, like other authors of the time, regarded as synonymous with *F. grallaria* Vieillot. He found that this species varied more than is usual among the *Procellaria*; the colour of the upper parts ranged from deep fuliginous brownish black to a much lighter plumbeous, or ashen hue. Some of them, the lighter coloured ones, had all of the dorsal feathers edged with white. He does not mention the remaining specimens, but evidently the white edges were missing in them. He found that the white under surface varied considerably in extent; in some cases it reached far up on to the throat, while in others it descended low on the breast as is the case with *melanogaster*. He found that in the series examined the tarsus measured from 37 mm. to 40.5 mm., and the middle toe and claw from 26 to 28 mm.

Coues, in discussing *Fregetta melanogaster*,²³ of which species he examined Gould's types, found that it was closely allied to the preceding both in form and colour, but stated that it differed consistently as follows:—It was slightly smaller but had longer tarsi and toes, the bill was longer and more slender, the wing nearly an inch (25 mm.) shorter, and the tail about 12 mm. shorter. He found that the central dark line of feathers on the abdomen was never entirely wanting, though it varied considerably, and in some specimens it was represented by only a few disconnected feathers. His great point of difference between the two species is the length of the toes.

Gould^{23a} also noted that *melanogaster* had longer toes than *leucogaster*. However, a glance at the characters and measurements of the series examined by us—in which the details were checked several times, bearing in mind that several of the specimens were named and labelled by Gould—it will be seen that no difference exists on this point between the two birds. Moreover, the bill, which is said to be more slender, and longer in *melanogaster* than in *leucogaster*, varies in individual specimens, while one *melanogaster* in the series before us has a broader and shorter bill than has any of the other birds. The measurements

given by Dr. Sharpe²⁴ will considerably support and strengthen our statements.

With reference to our inclusion of *Fregetta tubulata*^{24a} in the synonymy, we give the following data. When Gould²⁵ described *T. tropica*, *T. melanogaster* and *T. leucogaster* as new species,



Fregetta tropica, Gould.

These drawings have been made from specimens identified and labelled by Gould as follows:—4 and 6, *Thalassidroma leucogaster*; 5 and 7, *T. tropica*.

Long toes, middle one longest, spatulate but sharp claws; tarsus and basal joint of toes booted.

The extraordinary difference between the feet of this bird and those of *Freggettornis* will be seen on comparing them together.

he mentioned, and gave a short description of another bird which was killed near the coast of Australia; to this he did not attempt to attach a name, but said that its "nostril tube is much more lengthened than in any other species, and its apical portion

turned upwards or recurved, instead of being attached to the bill throughout its entire length as in the other members of the genus. In the distribution of its colouring it is very nearly allied to *T. tropica* and *T. leucogaster*, and it may be a mere variety of one or other of those species; but the bill, in addition to the feature pointed out above, is of a more slender and attenuated form than is observable in any other."

Mathews²⁶ examined this bird, to which he attached Gould's m.s. name of *Fregetta tubulata*, and found that the tube was as stated above. The feathers of the throat had light bases, the upper tail-coverts were white without black tips, tail square, the under tail-coverts dark; there were stray dark markings on the belly. The toes longer, and not so much flattened, and the claws longer and more spatulate than in *tropica* or *leucogaster*. Wing, 155; tarsus, 37; middle toe without claw, 21; middle toe and claw would make this measurement 26 or 27 mm.); culmen, 14.

We have before us, as stated previously, specimens of *T. tropica*, *T. melanogaster* and *T. leucogaster*, identified and labelled by Gould; and we are able to say definitely that some error has occurred in Gould's statement in regard to the nostril tube. Evidently in his types the nostril tube was flattened, this being due to want of special care when the skins were being prepared. We pointed out in another part of this paper that the under-surface of the nostril-tube is soft in life, and liable to collapse unless great care be taken in preparing a skin. The nostril-tube of Gould's bird, which was turned upwards, is therefore normal and apparently the same as in other members of the genus (see figs. 4 and 5); furthermore, we fail to see, on the measurements given by Mathews, that the toes of *F. tubulata* are longer and the claws more spatulate. We have Gould's own specimens of *T. leucogaster*, and they have the *longer*, not the *shorter*, toes.

This bird is supposed to be intermediate between *T. tropica* and *T. leucogaster*, which we have decided are synonymous, and we therefore have no hesitation in placing *F. tubulata* in the synonymy of *Fregetta tropica* Gould.

CONCLUSIONS.

As *Procellaria grallaria*¹⁵ Vieillot has been definitely placed in a separate genus from *Fregetta*; and as *T. leucogaster* Gould remains in the genus *Fregetta*, though it was previously confounded with Vieillot's species,¹⁴ it remained for us either to accept *leucogaster* as a distinct species or to place it in the synonymous list.

F. grallaria of authors other than Vieillot is undoubtedly *F. leucogaster* Gould.

T. melanogaster Gould has long been declared synonymous with *Fregetta tropica* Gould.

Fregatta tubulata Mathews²⁶ (Gould m.s.) was declared by Gould²⁵ to be almost intermediate between *tropica* and *leucogaster*, but he left it unnamed. *F. tubulata* is therefore a link between *tropica* and *leucogaster*; and on making comparisons we were led to the conclusion that all the above, except Vieillot's bird, are referable to *Fregatta tropica*.

FOOTNOTE REFERENCES TO NUMBERS TO BE FOUND IN TEXT.

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4. Mathews; Birds of Australia, vol. ii., pt. 1, 1912, p. 31.
5. Bonaparte; Compt. Rend., 1855, vol. xli., p. 1112.
6. Mathews; Birds of Australia, vol. ii., pt. 1, 1912, p. 37.
7. Mathews and Iredale; Manual of the Birds of Australia, vol. 1, 1921, p. 21.
- 7a. Mathews; List of the Birds of Australia, 1913, p. 32.
8. Mathews; Birds of Australia, vol. ii., pt. 1, 1912, p. 37, pl. 72.
- 8a. Mathews; Birds of Australia, vol. ii., pt. 1, 1912, p. 42.
9. Mathews and Iredale; Manual of Birds of Australia, vol. 1, 1921, p. 21.
10. Vieillot; Nouv. Dict. d'Hist. Nat., vol. 25, 1817, p. 418.
11. Mathews; Austral Avian Record, vol. 2, pt. 5, p. 86, and pt. 7, p. 124-125.
12. Mathews; Birds of Australia, vol. ii., pt. 1, 1912, p. 42.
13. Loomis; Proc. Calif. Acad. Sci. Ser. 4, vol. ii., pt. 2, No. 12, April, 1918, p. 182.
14. Mathews; Birds of Australia, vol. ii., pt. 1, 1912, p. 39.
15. Mathews; Birds of Australia, vol. ii., pt. 1, 1912, p. 31.
16. Godman; Monograph of Petrels, 1907, p. 65, pl. 18.
17. Philos. Trans. Roy. Soc. Lond., vol. 168, 1879, p. 130-131.
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19. Godman; Monograph of Petrels, pt. 1, 1907, p. 66.
20. Loomis; Proc. Calif. Acad. Sci. Ser. 4, vol. iii., pt. 2, No. 12, April, 1918, p. 33-39.
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23. Proc. Acad. Nat. Sci. Philad., No. 2, 1864, p. 85-87.
- 23a. Gould; Handbook to the Birds of Aust., vol. ii., 1865, p. 480.
24. Philos. Trans. Royal Soc. Lond., vol. 168, 1879, p. 131.
- 24a. Mathews and Iredale; Manual of the Birds of Australia, vol. 1, 1921, p. 20.
25. Gould; Ann. Mag. Nat. Hist., vol. xiii., 1844, p. 366-367.
26. Mathews; Birds of Australia, vol. ii., pt. 1, 1912, p. 41.

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 In addition of the above, a complete search has been made through the "Journal Fur Ornithologie," "The Avicultural Magazine," "The Auk," "The Ibis," and "The Emu."

New Sub-species of *Acanthiza nana*, Vigors and Horsfield

Acanthiza nana flava, sub-sp. nov.

By H. L. WHITE, R.A.O.U., &c., Belltrees, Scone.

Upper surface bright dark citrine, becoming yellowish on upper tail coverts; crown medal bronze; wings and tail edged yellowish citrine on outer webs; dark subterminal bar on tail; small frontal spot buff; ear coverts fuscous with fine white shaft-streaks; throat clay colour (deep buff), with fine white shaft-streaks; breast olive yellow on sides, tinged buff in centre; abdomen flanks and undertail coverts lemon chrome; bill brown; legs dark brown; eyes brown; length, 89 mm.; bill, 8 mm.; wing, 51 mm.; tail, 38 mm.; tarsus, 16 mm.

Type, male (425) in "H. L. White Collection," Nat. Mus., Melb., taken at Ravenshoe, near Herberton, North Queensland, June, 1922. *Co-type*, female (426), from the same locality, has the buff on the throat more restricted; wing, 45 mm.

This, the most northerly and the brightest race of *A. nana* yet discovered, comes from a region elevated over 3000 feet above sea level, where another interesting member of the genus is found, *viz.*, *A. pusilla katherina*, De Vis.